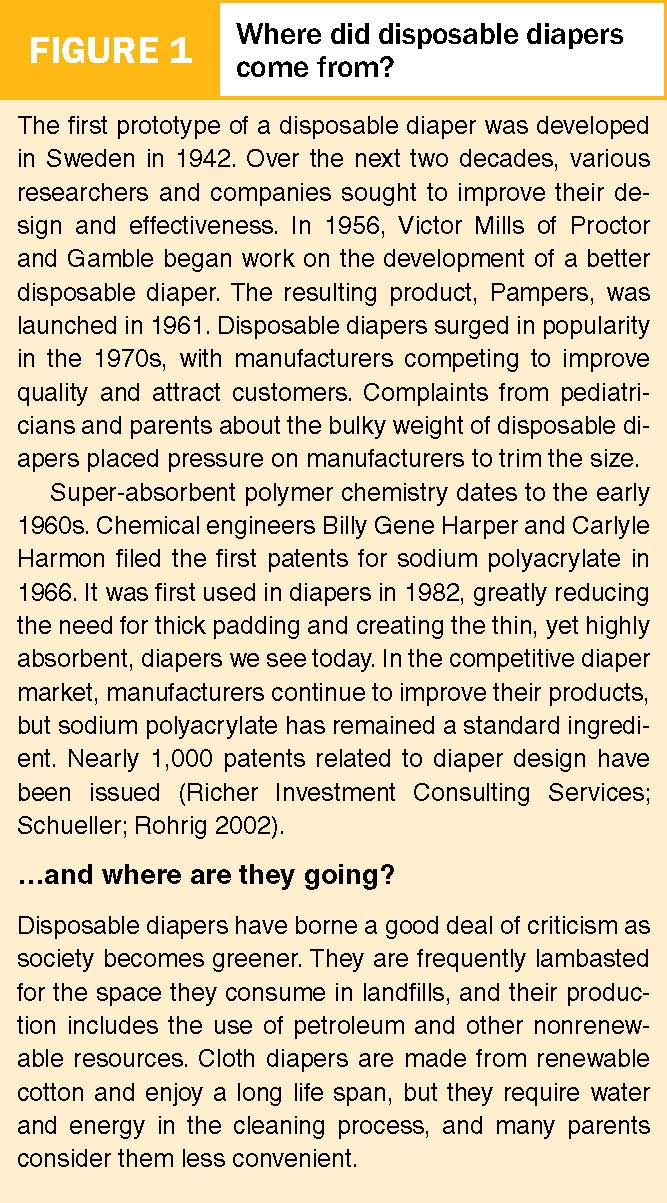
NO MORE LEAKS!!!

Process Oriented Lesson on the Chemistry and

Invention of Disposable Diapers



Guidelines:

In small groups, you will be investigating the super absorbent polymer that is found in disposable diapers, sodium polyacrylate.

Investigation:

1) Pour a beaker of water into a disposable diaper. Record any observations. How much can it hold before it leaks? \_\_\_\_\_\_\_\_ml

2) Cut open the diaper and record some observations.

3) Determine how you will measure the dependent variable before you start. For example, how will you measure the failing point? Excess water?

3) You will now be testing the diaper’s ability to absorb distilled water as well as different concentrations of salt water that will simulate urine.

**Materials needed:**

1 diaper per group for observation

Distilled water

NaCl solutions in 5%, 2%, 1% and 0.5% concentrations

Triple beam balance

Beakers

Pipettes

Graduated Cylinders

5 clear plastic cups

5 ml of Sodium Polyacrylate (diaper

polymer)

Gather all materials before you begin.

Activity Worksheet

Guide to Investigation

Objectives:

* Determines the relationship between diaper performance and saltwater concentration
* Use appropriate measuring techniques
* Prepare a graph to describe the relationships between a dependent and independent variable
* Summarize and display data in an orderly fashion

QUESTION – Write a question – example – What is the relationship between the concentration of saltwater and the amount of liquid a diaper can hold before it leaks?

HYPOTHESIS – A prediction and a reason: Example: As the concentration of the saltwater \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(increases/decreases) the amount of liquid absorbed \_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­\_\_\_\_\_\_\_\_ (increases/decreases/stays the same).

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

VARIABLES:

Independent Variable: (what the scientist can change) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dependent Variable (what you count, measure or observe) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Control Variables (what stays the same for each trial to make the test fair) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

PROCEDURE: (Read through ALL steps before you begin)

1) Collect all materials.

2) Use a graduated cylinder to put 1 ml of the diaper polymer (sodium polyacrylate) in each of the 5 plastic cups.

3) Measure the mass of each cup and record in the data table.

4) Obtain 150ml of the distilled water .

5) IMPORTANT: Before you begin, you and your partner must determine what it means when the polymer fails – when can it not absorb any more water. For example, when your tip the beaker on the side and the water starts to come out or when water leaks out of the gel in the cup, etc. This determines how you will measure the dependent variable.

6) Using the pipette, add 10 ml of water to the polymer at a time. Continuing adding water until the polymer and water are at the failure point you agreed on. Weigh the ending mass of the cup, polymer and solution and record in data table.

7) Subtract the starting mass from the ending mass at failure point to record the amount absorbed.

8) Repeat the steps starting with #4 with the other 4 solutions.

Data Table – (needs a specific title)

Now, check that your data table is complete and accurate for your observations.

ANALYSIS:

|  |  |  |  |
| --- | --- | --- | --- |
| **Solutions** | **Starting mass (in grams) of plastic cup and 1mL of diaper polymer** | **Ending mass (in grams) of cup, polymer, and solution at failure point** | **Amount of solution absorbed (in grams)** Subtract starting mass from end­ing mass |
| Distilled water (control) |  |  |  |
| 0.5% saltwater “urine” solution |  |  |  |
| 1 % saltwater “urine” solution |  |  |  |
| 2 % saltwater “urine” solution |  |  |  |
| 5 % saltwater “urine” solution |  |  |  |

1) Prepare a graph with “salt concentration” on the x-axis and mass of polymer and liquid on the y-axis. Plot the points and sketch a line through the points. See checklist for graph requirements.

CONCLUSION:

Now you can analyze the results – use the lab report checklist to ensure you cover all parts of the conclusion. Was your hypothesis correct, restate your initial hypothesis. Write about the data. What did the actual data say, on average which type of solution was absorbed more? Were there any sources of error? What could have gone wrong?